



# SEQUENCE LISTING

- <110> Dalemans, Wilfried L.J.  
Gerard, Catherine Marie Ghislaine
- <120> Compositions Comprising Human Papilloma Virus Proteins  
and Fusion Proteins Adjuvanted with a CpG Oligonucleotide
- <130> B45124
- <140> 09/581,976  
<141> 2000-06-20
- <150> PCT/EP98/08563  
<151> 1998-12-18
- <150> GB 9727262.9  
<151> 1997-12-24
- <160> 28
- <170> FastSEQ for Windows Version 3.0
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influenzae B and E7 from Human papilloma virus type  
16)

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35 40 45  
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val  
50 55 60  
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe  
65 70 75 80  
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr  
85 90 95  
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
100 105 110  
Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu  
115 120 125  
Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser  
130 135 140  
Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro  
145 150 155 160  
Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser  
165 170 175  
Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu  
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195 200 205  
Gln Lys Pro Thr Ser Gly His His His His His  
210 215 220

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influenzae B and E7 from Human papilloma virus type  
16)

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caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca 360  
ttgcatgaat atatgttaga tttgcaacca gagacaactg atctctactg ttatgagcaa 420  
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gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg 540  
tgcgtaacaa gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta 600  
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<223> Chimaeric protein (protein D from Haemophilus  
influenzae B and E6 from Human papilloma virus type  
16)

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
cgtttagtgg ttattcacga tcaactttta gatggcttga ctgatgttgc gaaaaaatc 240  
ccacatcgtc atcgtaaaga tggccggtac tatgtcatcg actttacctt aaaagaaatt 300  
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag 360  
cgaccagaaa agttaccaca gttatgcaca gagctgcaaa caactataca tgatataata 420  
ttagaatgtg tgtactgcaa gcaacagtta ctgcgacgtg aggtatatga ctttgctttt 480  
cgggatttat gcatagtata tagagatggg aatccatatg ctgtatgtga taaatgttta 540  
aagttttatt ctaaaattag tgagtataga cattattggt atagtttgta tggacaacaa 600  
ttagaacagc aatacaacaa accgttgtgt gatttggtta ttaggtgtat taactgtcaa 660  
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<223> Chimaeric protein (protein D from Haemophilus  
influenzae B and E6 from Human papilloma virus type  
16)

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Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35          40          45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50          55          60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65          70          75          80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85          90          95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100         105         110
Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
 115         120         125
Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
 130         135         140
Tyr Cys Lys Gln Gln Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
 145         150         155         160
Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys
 165         170         175
Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
 180         185         190
Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
 195         200         205
Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys
 210         215         220
Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
 225         230         235         240
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<211> 1116

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<223> Chimaeric protein (protein D from Haemophilus  
influenzae B and E6E7 fusion from Human papilloma  
virus type 16)

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag      360
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cgacccagaa agttaccaca gttatgcaca gagctgcaaa caactatata tgatataata	420
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cgggatttat gcatagtata tagagatggg aatccatatg ctgtatgtga taaatgttta	540
aagttttatt ctaaaattag tgagtataga cattattgtt atagtttgta tggaacaaca	600
ttagaacagc aatacaacaa accgttgtgt gatttgtaa ttaggtgtat taactgtcaa	660
aagccactgt gtcctgaaga aaagcaaaga catctggaca aaaagcaaag attccataat	720
ataaggggtc ggtggaccgg tcgatgtatg tcttggtgca gatcatcaag aacacgtaga	780
gaaaccagc tgatgcatgg agatacacct acattgcatg aatatatgtt agatttgcaa	840
ccagagacaa ctgatctcta ctgttatgag caattaaatg acagctcaga ggaggaggat	900
gaaatagatg gtccagctgg acaagcagaa ccggacagag ccattacaa tattgtaacc	960
ttttgttgca agtgtgactc tacgcttcgg ttgtgcgtac aaagcacaca cgtagacatt	1020
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<211> 371

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<213> Artificial Sequence

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<223> Chimaeric protein (protein D from Haemophilus  
influenzae B and E6E7 fusion from Human papilloma  
virus type 16)

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Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys	
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Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro	
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35 40 45	
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val	
50 55 60	
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe	
65 70 75 80	
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr	
85 90 95	
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met	
100 105 110	
Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu	
115 120 125	
Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val	
130 135 140	
Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe	
145 150 155 160	
Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys	
165 170 175	
Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr	
180 185 190	
Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro	
195 200 205	
Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys	
210 215 220	
Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn	
225 230 235 240	
Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser	
245 250 255	
Arg Thr Arg Arg Glu Thr Gln Leu Met His Gly Asp Thr Pro Thr Leu	
260 265 270	
His Glu Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys	

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 Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly  
 290                      295                      300  
 Pro Ala Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr  
 305                      310                      315                      320  
 Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr  
 325                      330                      335  
 His Val Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly  
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 His His His  
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<210> 7  
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 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae B and mutated E7 from Human papilloma  
 virus type 16)

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 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300  
 caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca 360  
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<210> 8  
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 influenzae B and mutated E7 from Human papilloma  
 virus type 16)

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 20                      25                      30  
 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp  
 35                      40                      45  
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val  
 50                      55                      60  
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe  
 65                      70                      75                      80  
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr

			85					90					95				
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met		
			100					105					110				
Ala	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	His	Glu	Tyr	Met	Leu	Asp	Leu		
			115					120					125				
Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Gly	Tyr	Gln	Gln	Leu	Asn	Asp	Ser		
			130					135					140				
Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly	Pro	Ala	Gly	Gln	Ala	Glu	Pro		
145						150					155				160		
Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr	Phe	Cys	Cys	Lys	Cys	Asp	Ser		
				165					170						175		
Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr	His	Val	Asp	Ile	Arg	Thr	Leu		
			180						185					190			
Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly	Ile	Val	Cys	Pro	Ile	Cys	Ser		
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cacacagacg	gcaactggta	ctgggttcgac	aactcaggcg	aaatggctac	aggctggaag											180	
aaaatcgctg	ataagtggta	ctatttcaac	gaagaagggtg	ccatgaagac	aggctgggtc											240	
aagtacaagg	acacttggta	ctacttagac	gctaaagaag	gcgccatggt	atcaaagtcc											300	
tttatccagt	cagcggacgg	aacaggctgg	tactacctca	aaccagacgg	aacactggca											360	
gacaggccag	aattggccag	catgctggac	atggccatgt	ttcaggaccc	acaggagcga											420	
cccagaaagt	taccacagtt	atgcacagag	ctgcaaacaa	ctatacatga	tataatatta											480	
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<210> 10  
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 <223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6 from Human papilloma virus type 16)

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Phe	Glu	Lys	Ile	Asn	Gly	Thr	Trp	Tyr	Tyr	Phe	Asp	Ser	Ser	Gly	Tyr		
			20					25					30				

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 Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp  
 50 55 60  
 Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val  
 65 70 75 80  
 Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met  
 85 90 95  
 Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr  
 100 105 110  
 Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met  
 115 120 125  
 Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu  
 130 135 140  
 Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu  
 145 150 155 160  
 Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp  
 165 170 175  
 Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr  
 180 185 190  
 Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr  
 195 200 205  
 Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr  
 210 215 220  
 Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys  
 225 230 235 240  
 Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg  
 245 250 255  
 Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys  
 260 265 270  
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 275 280 285  
 His His His His  
 290

<210> 11  
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<220>  
 <223> Chimaeric protein (Clyta from Streptococcus  
 pneumoniae and E7 from Human papilloma virus type  
 16)

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 cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag 180  
 aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc 240  
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 tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca 360  
 gacaggccag aattggccag catgctggac atggccatgc atggagatac acctacattg 420  
 catgaatata tgtagattt gcaaccagag acaactgata tctactgtta tgagcaatta 480  
 aatgacagct cagaggagga ggatgaaata gatggtccag ctggacaagc agaaccggac 540  
 agagcccatt acaatattgt aaccttttgt tgcaagtgtg actctacgct tcggttgtgc 600  
 gtacaaagca cacacgtaga cattcgtact ttggaagacc tgtaaatggg cacactagga 660  
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<210> 12

<211> 239  
 <212> PRT  
 <213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E7 from Human papilloma virus type 16)

<400> 12

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      20           25           30
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
      35           40           45
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
      50           55           60
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
      65           70           75           80
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
      85           90           95
Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
      100          105          110
Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
      115          120          125
Leu Asp Met Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met
      130          135          140
Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu
      145          150          155          160
Asn Asp Ser Ser Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln
      165          170          175
Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys
      180          185          190
Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile
      195          200          205
Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro
      210          215          220
Ile Cys Ser Gln Lys Pro Thr Ser Gly His His His His His His
      225          230          235

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<210> 13  
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<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 13

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cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag      180
aaaatcgctg taaagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc      240
aagtacaagg acacttggtg ctacttagac gctaaagaag gcgccatggt atcaaagtc      300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca      360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga      420
cccagaaagt taccacagtt atgcacagag ctgcaaacaa ctatacatga tataatatta      480

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gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg 540
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ttttattcta aaattagtga gtatagacat tattgttata gtttgtaggg aacaacatta 660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaag 720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata 780
aggggtcggg ggaccgggtc atgtatgtct tgttgcatg catcaagaac acgtagagaa 840
acccagctga tgcattggaga tacacctaca ttgcatgaat atatgttaga ttgtcaacca 900
gagacaactg atctctactg ttatgagcaa ttaaatagaca gctcagagga ggaggatgaa 960
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tgttgcaagt gtgactctac gtttcgggtt tgcgtacaaa gcacacacgt agacattcgt 1080
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<210> 14  
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 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (Clyta from Streptococcus  
 pneumoniae and E6E7 fusion from Human papilloma  
 virus type 16)

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<400> 14
Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys
 1           5           10           15
Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr
 20           25           30
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
 35           40           45
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
 50           55           60
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
 65           70           75           80
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
 85           90           95
Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
 100          105          110
Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
 115          120          125
Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu
 130          135          140
Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu
 145          150          155          160
Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp
 165          170          175
Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr
 180          185          190
Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr
 195          200          205
Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr
 210          215          220
Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys
 225          230          235          240
Pro Leu Cys Pro Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg
 245          250          255
Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys
 260          265          270
Arg Ser Ser Arg Thr Arg Arg Glu Thr Gln Leu Met His Gly Asp Thr
 275          280          285

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Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp  
 290 295 300  
 Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu  
 305 310 315 320  
 Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn  
 325 330 335  
 Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val  
 340 345 350  
 Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly  
 355 360 365  
 Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln Lys Pro Thr Ser Gly  
 370 375 380  
 His His His His His His  
 385 390

<210> 15  
 <211> 684  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae B and E7 from Human papilloma virus type  
 18)

<400> 15  
 atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc 60  
 attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120  
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
 cgtttagtgg ttattcacga tcaacttttta gatggcttga ctgatgttgc gaaaaaatc 240  
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300  
 caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca 360  
 ttgcaagaca ttgtattgca tttagagccc caaaatgaaa ttccggttga ctttctatgt 420  
 cacgagcaat taagcgactc agaggaagaa aacgatgaaa tagatgaagt taatcatcaa 480  
 catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag 540  
 tgtgaagcca gaattgagct agtagtagaa agtcagcag acgaccttcg agcattccag 600  
 cagctgtttc tgaacaccct gtcctttgtg tgtccgtggg gtgcatccca gcagactagt 660  
 ggccaccatc accatcacca ttaa 684

<210> 16  
 <211> 227  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae B and E7 from Human papilloma virus type  
 18)

<400> 16  
 Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys  
 1 5 10 15  
 Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro  
 20 25 30  
 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp  
 35 40 45  
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val  
 50 55 60  
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe  
 65 70 75 80

Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr  
 85 90 95  
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
 100 105 110  
 Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu  
 115 120 125  
 Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu  
 130 135 140  
 Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Glu Val Asn His Gln  
 145 150 155 160  
 His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys  
 165 170 175  
 Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser  
 180 185 190  
 Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser  
 195 200 205  
 Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His  
 210 215 220  
 His His His  
 225

<210> 17  
 <211> 109  
 <212> PRT  
 <213> Escherichia coli

<400> 17  
 Met Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp  
 1 5 10 15  
 Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp  
 20 25 30  
 Cys Gly Pro Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp  
 35 40 45  
 Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn  
 50 55 60  
 Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu  
 65 70 75 80  
 Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser  
 85 90 95  
 Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala  
 100 105

<210> 18  
 <211> 684  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae B and mutated E7 from Human papilloma  
 virus type 18)

<400> 18  
 atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc 60  
 attattgctc accgtggtgc tagcgggttat ttaccagagc atacgttaga atctaaagca 120  
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
 cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240  
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300  
 caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca 360  
 ttgcaagaca ttgtattgca ttagagcccc caaaatgaaa ttccggttga ccttctaggt 420

caccagcaat taagcgactc agaggaagaa aacgatgaaa tagatggagt taatcatcaa	480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag	540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag	600
cagctgtttc tgaacaccct gtcctttgtg tgcccggtgt gtgcatccca gcagactagt	660
ggccaccatc accatcacca ttaa	684

<210> 19  
 <211> 227  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae B and mutated E7 from Human papilloma  
 virus type 18)

<400> 19

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys	
1 5 10 15	
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro	
20 25 30	
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp	
35 40 45	
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val	
50 55 60	
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe	
65 70 75 80	
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr	
85 90 95	
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met	
100 105 110	
Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu	
115 120 125	
Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Gly His Gln Gln Leu	
130 135 140	
Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln	
145 150 155 160	
His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys	
165 170 175	
Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser	
180 185 190	
Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser	
195 200 205	
Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His	
210 215 220	
His His His	
225	

<210> 20  
 <211> 837  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae virus B and E6 from Human papilloma  
 virus type 18)

<400> 20

atggatccaa gcagccattc atcaaatatg gcgaataccc aatgaaatc agacaaaatc	60
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<210> 22  
 <211> 1152  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae B and E6E7 fusion from Human papilloma  
 virus type 18)

<400> 22  
 atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc 60  
 attattgctc accgtggtgc tagcgggtat ttaccagagc atacgttaga atctaaagca 120  
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
 cgtttagtgg ttatttcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc 240  
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300  
 caaagtttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg 360  
 cgaccctaca agctacctga tctgtgcacg gaactgaaca cttcactgca agacatagaa 420  
 ataacctgtg tatattgcaa gacagtattg gaacttacag aggtatttga atttgcattt 480  
 aaagatttat ttgtggtgta tagagacagt ataccgcatg ctgcatgcca taaatgtata 540  
 gatttttatt ctagaattag agaattaaga cattattcag actctgtgta tggagacaca 600  
 ttggaaaaac taactaacac tgggttatac aatttattaa taaggtgcct gcggtgccag 660  
 aaaccgttga atccagcaga aaaacttaga caccttaatg aaaaacgacg atttcacaac 720  
 atagctgggc actatagagg ccagtgccat tcgtgctgca accgagcagc acaggaacga 780  
 ctccaacgac gcagagaaac acaagtaatg catggaccta aggcaacatt gcaagacatt 840  
 gtattgcatt tagagcccca aaatgaaatt ccggttgacc ttctatgtca cgagcaatta 900  
 agcgactcag aggaagaaaa cgatgaaata gatggagtta atcatcaaca tttaccagcc 960  
 cgacgagccg aaccacaacg tcacacaatg ttgtgtatgt gttgtaagtg tgaagccaga 1020  
 attgagctag ccttagaaaag ctcagcagac gaccttcgag cattccagca gctgtttctg 1080  
 aacaccctgt tcttgtgtg tccgtggtgt gcatccagc agactagtgg ccaccatcac 1140  
 catcaccatt aa 1152

<210> 23  
 <211> 383  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
 influenzae B and E6E7 fusion from Human papilloma  
 virus type 18)

<400> 23  
 Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys  
 1 5 10 15  
 Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro  
 20 25 30  
 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp  
 35 40 45  
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val  
 50 55 60  
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe  
 65 70 75 80  
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr  
 85 90 95  
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
 100 105 110  
 Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu

115	120	125
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val		
130	135	140
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe		
145	150	155
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys		
165	170	175
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr		
180	185	190
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly		
195	200	205
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn		
210	215	220
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn		
225	230	235
Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala		
245	250	255
Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Met His Gly		
260	265	270
Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu Pro Gln Asn		
275	280	285
Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser Asp Ser Glu		
290	295	300
Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His Leu Pro Ala		
305	310	315
Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met Cys Cys Lys		
325	330	335
Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser Ala Asp Asp Leu		
340	345	350
Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe Val Cys Pro		
355	360	365
Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His His His His		
370	375	380

<210> 24  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

<400> 24  
 tccatgacgt tcctgacgtt

20

<210> 25  
 <211> 18  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

<400> 25  
 tctcccagcg tgcgccat

18

<210> 26  
 <211> 30  
 <212> DNA  
 <213> Artificial Sequence

<220>

<223> Synthetic

<400> 26

accgatgacg tcgccggtga cggcaccacg

30

<210> 27

<211> 6

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 27

rrcggy

6

<210> 28

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> E.coli

<400> 28

Thr Ser Gly His His His His His

1

5